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OUR CONTRIBUTORS

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RATS – *with a difference*

By D. G. Davey (Pharmaceuticals Division)

In the battle to defeat disease, one of the complications is that the rats and mice on which new drugs are tested are often themselves already the victims of disease. Thus testing can be misleading. To overcome this, Pharmaceuticals Division have broken new ground in a gigantic pioneering effort: no less than the breeding of disease-free animals from stock born of Cæsarean operation.

Drawings by Michael Leonard

A family of rats in one of the cages. One rat is drinking from a water nipple.

Rats and mice have featured in laboratory experiments for at least 300 years—Robert Boyle used them—but it is only during the last half-century that the number has soared to astronomical figures. They have been amongst the tools, of course, with which the cause and course of disease have been progressively unravelled. The success to which they have contributed so much has been great—witness the continuing sequence of vitamins, hormones, synthetic drugs and antibiotics—and because each victory points to another, their help is demanded more and more. Many diseases are in the bag, or almost there, and now the pursuit is hard after flu, the common cold, cancer, heart disease and mental illness.

Who first used white rats and white mice in a laboratory I do not know. Were they always as bad as they are now? Were mouse typhoid, mouse polio, mouse pox, rat pneumonia always so prevalent? I suspect they were, which makes it surprising that the people so busy ridding mankind of disease should have become conscious only during the past few years of the nuisance presented to their work by the diseases present in the rats and mice they use.

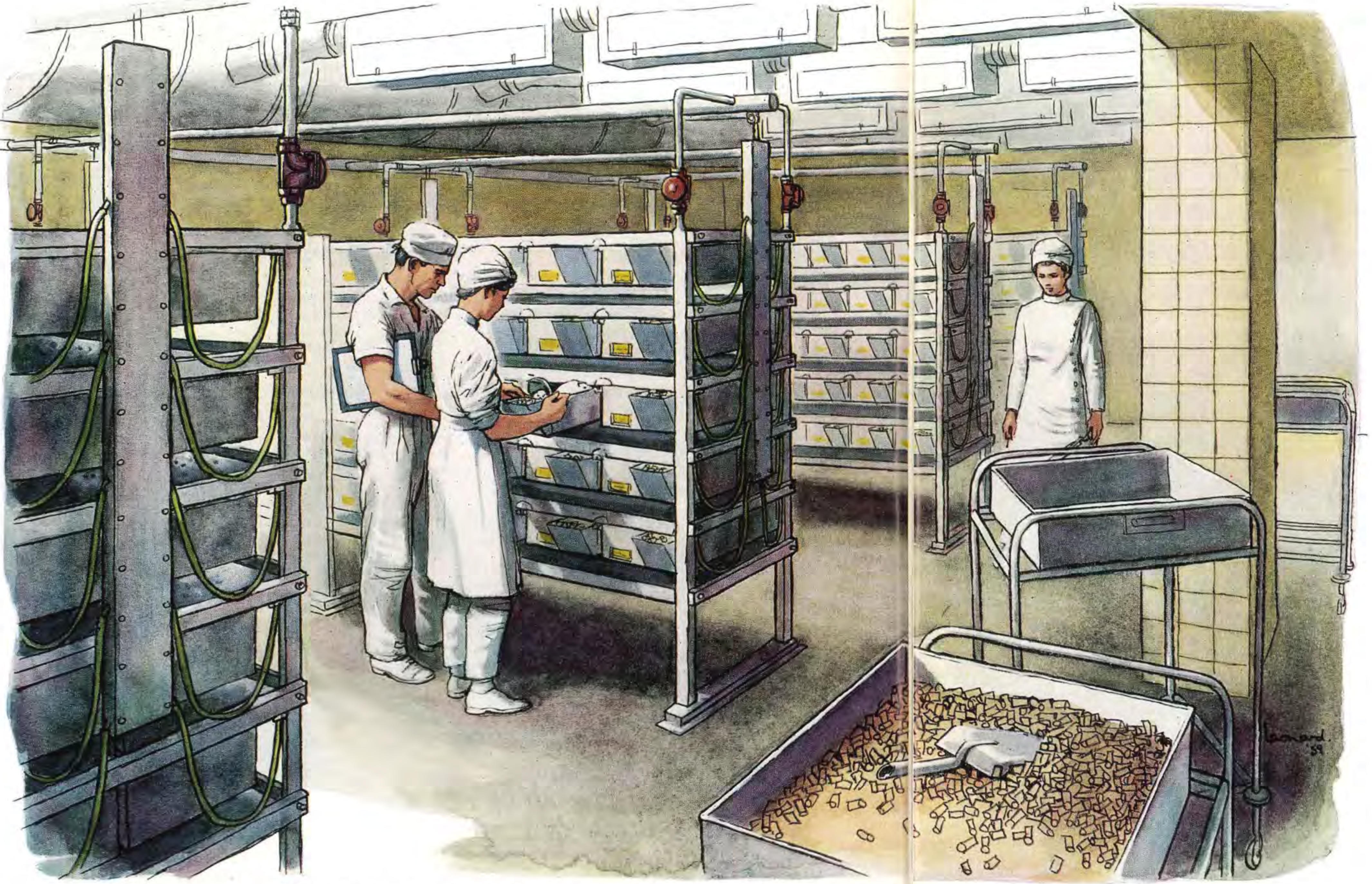
Awareness of the problem is now worldwide, but there are few places where it is being tackled seriously. In Britain, only I.C.I. has faced up to the huge effort involved. New research laboratories for the Pharmaceuticals Division were being talked about shortly after the last war; and from the beginning it was envisaged that they would have to include a special building where disease-free rats and mice could be bred.

Such disease-free animals do not exist naturally, but have to be raised in a particular way. There was possibly one laboratory in the world where we could have got some to give us a start. This laboratory is in the University of Notre Dame, Indiana, where a small group of enthusiasts have been raising completely germ-free animals since the early nineteen forties. We decided, however, to do it ourselves, and we used much of the Notre Dame technique, although we think we improved on some of it. Actually, we might not have started our project at all were it not for the work already done there.

The concept of what we sought to do is simple. Very few infectious diseases are transmitted in the womb between the mother and her offspring, and we do not know of any in rats. Some structural or functional diseases are inherited through the genes, but these can be avoided by selecting the parents. The contamination of the offspring, then, that we wished to prevent, starts at birth through physical contact with the mother, the offspring breathing in the air she breathes out, licking her and becoming soiled with her excreta. To avoid it we must sidestep natural birth and take the babies from the mother by Cæsarean operation and raise them artificially. This is what we did—with rats.

Pregnancy in rats lasts a relatively short time, twenty-two days plus or minus a few hours. It is so short that a matter of hours in the timing of a Cæsarean operation makes all the difference between success and failure to raise the offspring. We learned this to our cost in many weeks of wasted work, although we timed the matings, and therefore the time of the birth, as accurately as we could. Thereafter we continued to calculate when birth should take place, but now we sat by the bedside and waited for the first baby to be born before we operated on the mother to take out the others. Rats average about

The special air-conditioned, insect-proofed building in which disease-free rats and mice are bred



The animal cages where "clean" rats and mice feed and breed. They live off sterilised food, and excreta falls on to glass panels where they are flushed away by an automatic watering system.

ten babies in a litter and we could afford to waste one. Interestingly enough, the strain of rats we used behaved like the human race and produced its babies in the early hours!

We fed them on "Cow and Gate," though not quite according to the directions on the tin, and we gave a feed every three hours throughout the day and night. We never succeeded in getting sufficient food into them by allowing them to suckle at any thing we could devise, and therefore we fed them forcibly by pushing a small rubber tube down the throat into the stomach and squirting the desired quantity of food into them from a syringe. A baby rat, when first born, is only about an inch long, and pushing a rubber tube into its stomach may seem to demand a great skill. Actually, although it is a delicate operation, it is not difficult and most people with reasonable control of their hands can learn to do it quite quickly.

We had to do it many times because we found that we damaged the baby rats if we gave too much food in one squirt, and so each feed was divided into four or five and given at intervals of ten minutes. About forty baby rats were tended at one time, and the worker feeding them was lucky if he had more than a quarter of an hour in every three hours free from his charges. He had one little variation in his life. At least every six hours, and sometimes every three, he took a small camel's hair paint brush, dipped it in water, and cleaned up the other end. He looked at baby rats all day (or all night) and during the few minutes he spoke to his wife when he got home I am sure he spoke about rats. Perhaps she—and there are four such shes—can be forgiven for thinking that he gave more care and time to his rats than he ever did to his children. Each of the four men who helped to raise these rats—and I was not one of them—was an enthusiast, but none would like to contemplate artificially feeding rats for ever.

In the beginning the man on duty was alone with his baby charges in that big building. He had them in a small glass-fronted cabinet to give them a local environment, and perhaps he wondered if all the cages in the rooms around him would ever be filled. Well, they are becoming filled. We have raised sufficient rats artificially to give us a nucleus and now they are running together and nature is doing the rest. We also have guinea pigs which we raised in a somewhat similar way, and we have mice derived from mice which we obtained by Cæsarean operation and which we raised by foster-mothering them on our clean rats.

And what of the building in which this unique work is going on? It is a very special building, in which the most elaborate precautions are taken to prevent contamination by disease from the outside world.

Firstly, there is an absolute barrier between the "dirty" (outside world) and the "clean" (inside world) parts of the building. Everything, except people, entering the clean areas must go through double-ended autoclaves where it can be subjected to heat and so any contamination killed. The inner door of an autoclave, opening on the clean side, is not

A Cæsarean operation in its final stages. Produced by Cæsarean methods, baby rats have no chance of picking up disease from their mothers.

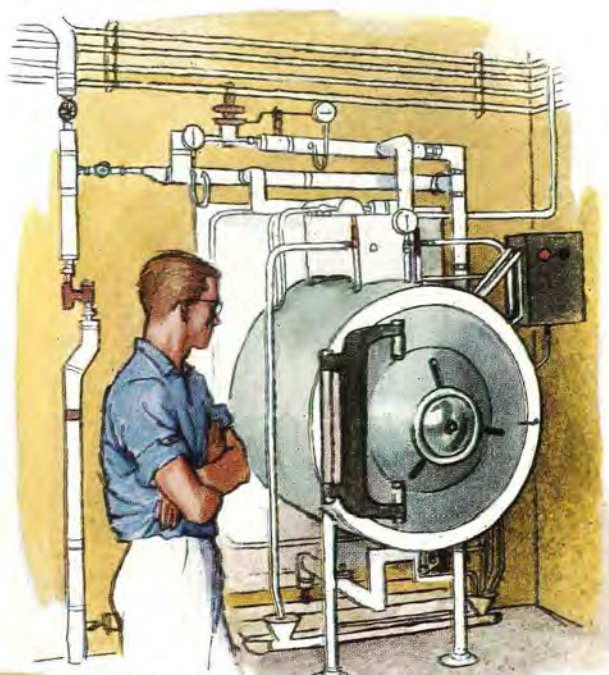
Everybody must be free of contamination. The drill is strip, take a shower, put on sterilised clothing.

opened unless the outer door is shut and until a sterilisation cycle has been completed. The autoclaves also serve as the traps through which animals can be brought out. The animals are not cooked, of course, on their way, but the autoclave is not opened again on the inside until it has been sterilised once more.

Secondly, the pellets of food on which the animals are fed are made within the building. The raw materials—cereals, milk powder, vitamins and minerals—are received into a big steel chamber or "kettle" where they are kept churning round and round while they are heated sufficiently long to kill the unwanted germs. Then a valve is opened and the mixture is passed through a steel pipe in the floor to a "clean" area where it is pelleted, and from this area the pellets are sent to the animal quarters through chutes.

Thirdly, the "decontamination quarters" for the people working with the animals are in a separate building connected with the main building by an enclosed way. The quarters (separate for male and female) are in two parts, one leading to the other through a shower. You strip in one part, take a shower, enter the other part and dress in clothes brought in through an autoclave (the first person ever to go in had to run naked to the nearest

The "dirty" end of an autoclave



Through these autoclaves passes everything that enters the building except human beings. Complete sterilisation is thus ensured. Here the autoclaves are being opened at the "clean" end.

Sterilised food pellets being delivered by chute from the mixing floor above

autoclave). Then you walk along the enclosed passage and enter the main building through an air-lock of three doors. Insecticide is continually dispersed in the stripping area and in the air-lock. Ultra-violet lights are also continually on in the air-lock.

Other points of interest in the building can be dismissed briefly. There are no windows to the animal quarters, and a twelve-hour light, twelve-hour darkness cycle is maintained throughout the year. Ventilation is by means of filtered and heated air carried by ducts throughout the building. Cages for the animals, and the racks to hold them, are original in design, and much thought was given to make them not only just right for the animals, but labour saving for the staff. In the whole building there are 13,000 cages. Under normal practice each cage would carry a water bottle which would have to be filled each day and cleaned frequently. We avoided this quite gigantic chore by incorporating a system of automatic watering into the structure of the rack. We have also arranged for most of the excreta from the animals to fall on a glass plate which can be flushed down.

The fame of these buildings is spreading over the world for the imagination of their design and for the courage that lies behind it. There is a brave-new-world touch to it all. Its scale is big because we want to produce about 1500 rats and 5000 mice each week.

So far, everything is fine. The animals are not germ-free, of course, because they acquire bacteria from us, and we have also given them some bacteria which we think they ought to have. The diseases, however, that we wanted to leave outside remain outside. Our breeding stock of rats has now grown sufficiently big for us to think of issuing offsprings to the laboratories for experimental use. Will we now see the end of animals dying when we do not want them to die, of results complicated by disease over which we had no control? We hope so. We plan to send out the first lot of our rats that are different this October. Perhaps when you read this, they are going out.

Feeding the food pellets into the hopper attached to the cages

An immensely delicate task—the artificial feeding of baby rats

Modern Marvels—19

THE POLYCHROMATOR

By M. Milbourn (Metals Division)

Metals Division produces some 300 different alloys; and it is therefore important for the metallurgist to be able to check quickly on the accuracy of the mixture. An ingenious instrument for this purpose is the polychromator which makes use of the fact that every metal will emit characteristically coloured light rays when subjected to testing under electrical discharge.

ANALYSIS was one of the earliest scientific techniques to be introduced into industry, and it is still very important, because producers and consumers, designers and technologists must know the compositions of materials they are handling. Continuous efforts are made, both inside the Company and elsewhere, to improve and speed up analytical procedures, and instruments are used more and more for this purpose.

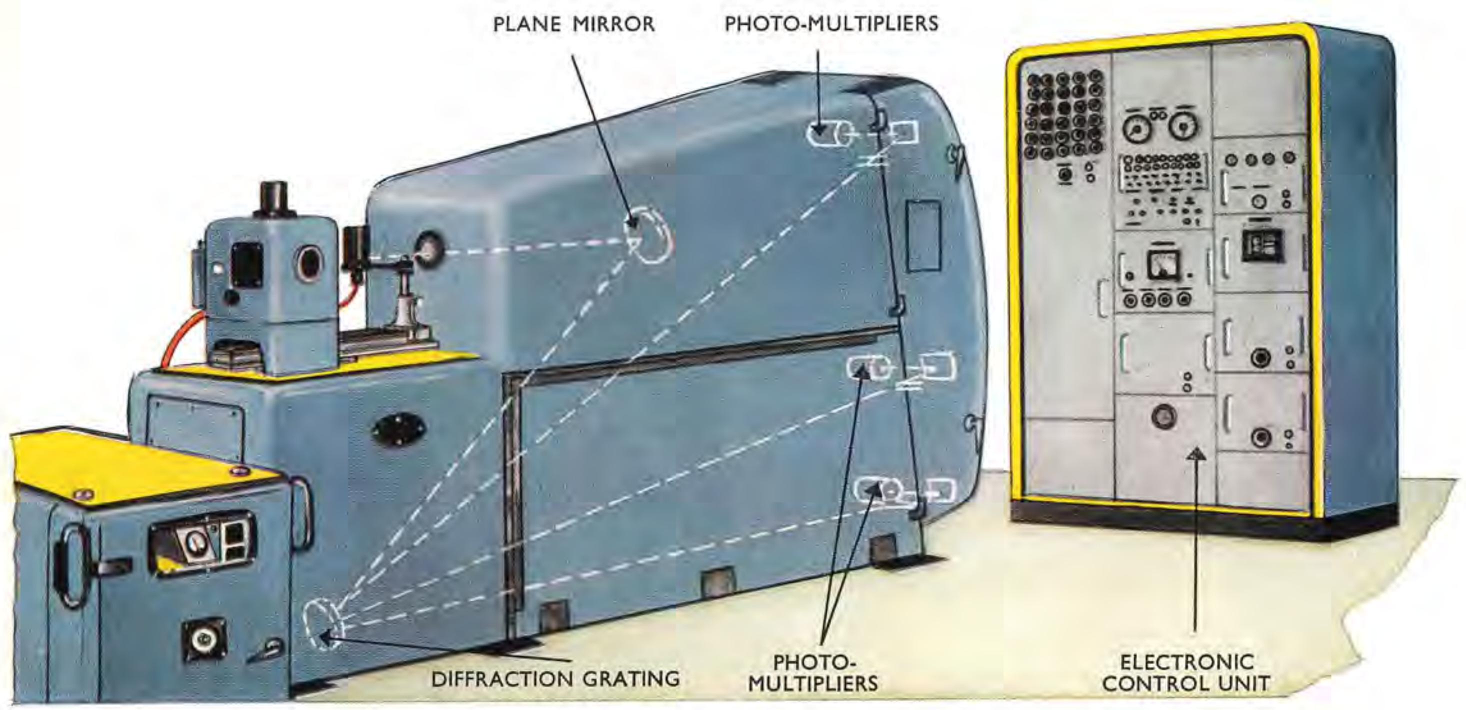
One such instrument, being employed for the analysis of metals and alloys, is the polychromator. The name signifies that the instrument is selecting and measuring several rays of light of different colours. The light comes from an electric discharge, such as an arc or a spark, which passes to a piece of the metal being analysed.

By way of example, an arc can sometimes be seen between the contacts of a switch, when an electric circuit is just being broken. If the contacts are of copper, the arc emits rays of green-coloured light, which are typical of copper. Any other metallic element, such as zinc, aluminium, tin, nickel, iron or titanium, will emit rays of different colours, when it is present in the electric discharge. If an alloy is being analysed, several elements are present together, and each provides its characteristic rays.

The polychromator consists of three parts. The first is a carefully designed electrical circuit which provides a controlled discharge to the metal; the second spreads out the light from this discharge into a spectrum (or rainbow) and selects from it the required rays; the third is electronic gadgetry for measuring the intensities of the rays, controlling the sequence of operations and presenting the results. The light is formed into a spectrum by a diffraction grating, which is a reflecting surface on which are scribed a very large number of fine parallel lines. The lines are about two inches long, and there are 75,000 in a length of three inches. The different rays must be well separated, so that they can be selected without interference from others, and the spectrum is therefore more than a yard long (in a vertical plane). The dispersing part of the instrument is twelve feet long and six feet high.

The intensity of each ray depends on the amount of the particular element in the material being analysed. Thus, 5% of magnesium in an aluminium alloy produces a much stronger ray than 1%. The intensity is measured with an electronic device, a photo-multiplier, which converts light

An example of an alloy spectrum. On the left are the violet rays emitted by aluminium, in the centre the blue rays emitted by zinc, and on the right the green rays emitted by copper.



On the right is the electronic control unit. On the left, the optical system which selects the light rays.

into a small electric current. This current is stored on an electrical condenser while a test is proceeding, the voltage on the condenser is measured subsequently, and the result is printed on a paper strip. The relationship between the amount of element in the sample and the printed number is established by testing samples of alloys containing known amounts of the element in question.

Several metallic constituents can be dealt with at once, selecting one ray, or sometimes two, characteristic of each. There is one photo-multiplier and one storage condenser for every ray, the total being more than twenty.

We can now consider what happens during a test and how it proceeds. The prepared piece of alloy is placed in position, the start button pressed and then the instrument takes over. The electric discharge is started, the light from it is directed on to the diffraction grating, and the rays selected from the consequent spectrum fall on their respective photomultipliers. The condensers store the currents from the multipliers until the discharge is switched off after a defined period of 30–40 seconds. Each storage condenser is then connected to the measuring circuit in turn, and the measurement from each is printed on the paper strip. The whole operation takes about two minutes. The printed numbers are converted into amounts of the various constituents by means of tables or graphs. Complete analytical results are available within a few minutes of receipt of the sample in the laboratory.

There is, of course, much more to the polychromator than can be included in these brief paragraphs. It is a most elegant instrument, with many cunning devices, mechanical, electrical, optical and electronic.

The American equivalent is the quantometer, and Metals Division has one of each, as well as two smaller, simpler and consequently cheaper instruments of the same type, also made in this country. Are they any more than expensive gadgets for the amusement of analysts? They most certainly are, and they earn their keep by providing analytical results which are as reliable as those produced in other ways, but which are available much more quickly.

The last point is the vital one in metallurgical processes, where alloys are being prepared by melting the constituents together and casting into shapes. Formerly the cast material in the form of billets and rolling slabs would be held in stock until analysis had shown that their compositions were correct, when they could go forward for further processing. If they were of the wrong composition, they would have to be cut up and re-melted, a wasteful and expensive operation. Now that the analysis can be carried out in a few minutes, the composition can be controlled during the melting process itself and the metal is not cast until the analysis is available. The resultant economies in the form of reduced work in process and reduction in scrap more than justify the use of the expensive equipment.

'GENTLEMEN, *START YOUR ENGINES—'*

MR. P. C. ALLEN

(President of Canadian Industries Limited)

recalls his experiences at the

'INDIANAPOLIS 500'

The author's ticket stub and "rain check"

FOR forty years I had wanted to see the 500-Mile Race at Indianapolis and in 1959 the opportunity came at last. Ever since I had been a schoolboy I had followed the race in the motoring papers from the early exploits of Jules Goux, Rénè Thomas, Ralph de Palma and Gaston Chevrolet, through the twenties and thirties and the heyday of the Miller and Duesenberg cars, then the days of the great Wilbur Shaw who last won in a European car, to the present-day heroes like Bill Vukovitch and the Rathmann brothers.

I had read so much and so often about the track and its surroundings and the general atmosphere of the race and its preliminaries that I thought that there could be few surprises. How wrong can you be?

I knew, for example, that the track was 2½ miles around, with two long and two short straights and four distinct bends, slightly banked and brick-paved. Well, that was approximately correct; but now the brick surface only survives along the home stretch and that I imagine is for sentimental reasons so that the old "Brickyard" can still keep its nickname. I was not prepared for the vastness of the "infield" which accommodates the paddock, the hospital, a huge car park, much empty space and a nine-hole golf course, together with several belts of trees, all of which combine to make it impossible to see the race as a whole from any point.

The crowds I knew would be huge—and they were —some 200,000 was the estimate and they were most skilfully got into and out of the grounds. The grandstands are enormous and the only comparison I can make is with Flemington race course on Melbourne Cup Day when the immense stands there are packed with people.

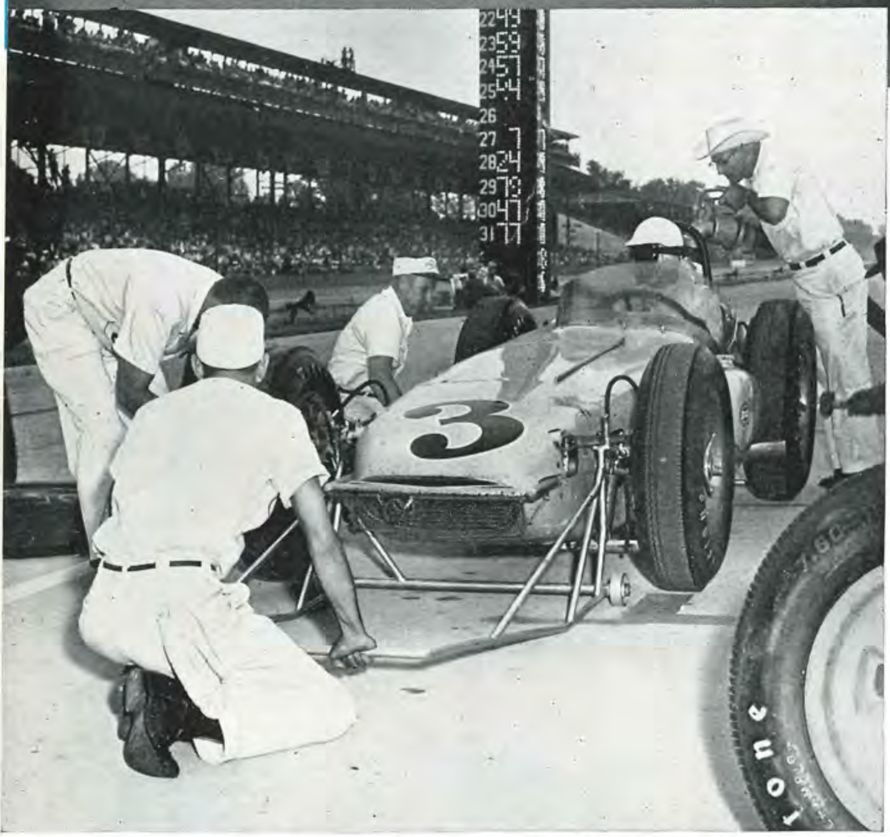
Then, to be sure, it was no surprise that there was a big band parading along the home straight; I was prepared for that, but not quite for a band from Purdue College 200 strong, with so vast a drum that it had to be accommodated in a motor-car, and headed by not one drum majorette but nine drum majorettes, led in turn by a "Golden Girl" dressed in glittering gold sequins, twirling a baton.

And so the excitement gradually built up and with it the temperature to a sweltering 88° F. with lowering storm clouds. The crowds sat or walked in shirt-sleeves or more abbreviated dress and I would guess that we three Englishmen wore the only coats in the place that day as we worked our way to our seats. Everywhere there were stalls and booths selling sun-hats and comic hats, mementoes, pictures, flags on sticks, soft drinks and junk. The hats ranged from Venetian gondoliers' via cowboy styles to Tyrolean pork-pies with exaggerated feathers which were mounted on top of as little dress as the owner cared to carry, often a shirtless top for the men or Bermuda shorts and black stockings. For the richest country in the world the crowd seemed to me shockingly tough-looking, uncouth and ill-dressed in sharp contrast to the low sleek magnificence of the modern cars in the parks, or the almost overpowering decoration of the motor-cycles.

In the infield was an outstanding collection of apparatus designed to afford its owners a private view of the track. Every builder and contractor for miles around and many other persons must have brought a carload of tubular scaffolding and planks to build himself a private precarious perch up to 30 ft. or more high for his party. I suppose it would not have been difficult to count 100 of such erections inside the track.

The winning Leader Card 500 Roadster. Accessory manufacturers' emblems are prominently displayed.

The Leader Card 500 Roadster at speed



A quick tyre change at the pits. Special treads on the right-hand side only counteract the centrifugal force of the 2½ mile anti-clockwise track.

There was too the atmosphere of a refugee camp in the back areas, almost that of a mass migration, with paper and litter in profusion, spent cardboard cups and beer cans, people asleep in all postures and an incredible amount of cooking going on. For this the furniture and apparatus brought to the track made a mere European's eyes bulge from his head.

No question here of a packet of sandwiches and a bottle of beer—there were chairs and tables, innumerable stoves and fire-places fed with charcoal, specially brought in sacks, on which chickens and steaks were being roasted so that the savour was enough to torment a hungry man; add to these whole hams, loaves of bread, salads, beer, great containers full of ice and the frosted glasses of dry Martinis and the slovenly appearance of the clothing was submerged by the manifestly high standard of the living. The last word on this point can perhaps be stated here and in many ways it was the most surprising feature of a fully surprising day. In the private parks at the municipal airport were 250 private aircraft of every size, make and description which had flown up with their owners to see the race.

And so to the motoring. This year 33 cars qualified to take part in the race and it is astounding, at any rate to me, that in the 10-mile qualifying time trials only 8·2 seconds separated the fastest car at 145·908 m.p.h. from the slowest at 141·215 m.p.h. The machines which are, of course, specially built for Indianapolis were all, with three exceptions, which got nowhere, powered with 4-cylinder unblown 4¼ litre engines of the Offenhauser design, some lying on their sides, some upright and some canted over. They were all finely finished in all the colours of the rainbow.

Although virtually all the engines come out of one workshop, and the cars from not more than half a dozen builders, the names they carry are those of the sponsors who have paid for them and weird and wonderful they sound after the comparative simple titles like Ferrari, Aston-Martin, or even B.R.M. In the line-up of cars, all of which had qualified at over 141 m.p.h., we had a Leader Card 500 Roadster—which indeed won the race—a John Zink Heater Special, a Bryant Heating and Cooling Special, a Belond AP Muffler Special and, believe it or not, a McNamara Chiropractic Special. Never mind the names, these cars can go and when some of them came to Milan recently they showed just how fast they can go, with over 170 m.p.h. on the scoreboard to show a clean pair of heels to the fastest Europe could produce.

So the bands paraded, the crowds poured in, the temperature rose and the clock crept on towards 11 a.m.

At 10.15 the band played a local anthem "On the Banks of the Wabash"; at 10.30 the cars were pushed out on the track and the flash bulbs sparked. Then maroons began to punctuate the time, the bands played the "Star Spangled Banner" at 10.35 and at 10.40 "Taps"; at 10.49 "Back Home Again in Indiana," the State hymn was played, and 10,000 balloons were released from the infield.

Then on the dot of 10.52 a.m. on the loudspeakers came the long awaited stentorian command, "Gentlemen, start your engines"; the portable motors whirred and cut out as one by one the snarling roar of the racing cars burst over and above the chattering clamour of the crowd.

Then, two minutes later, the whole field, with one

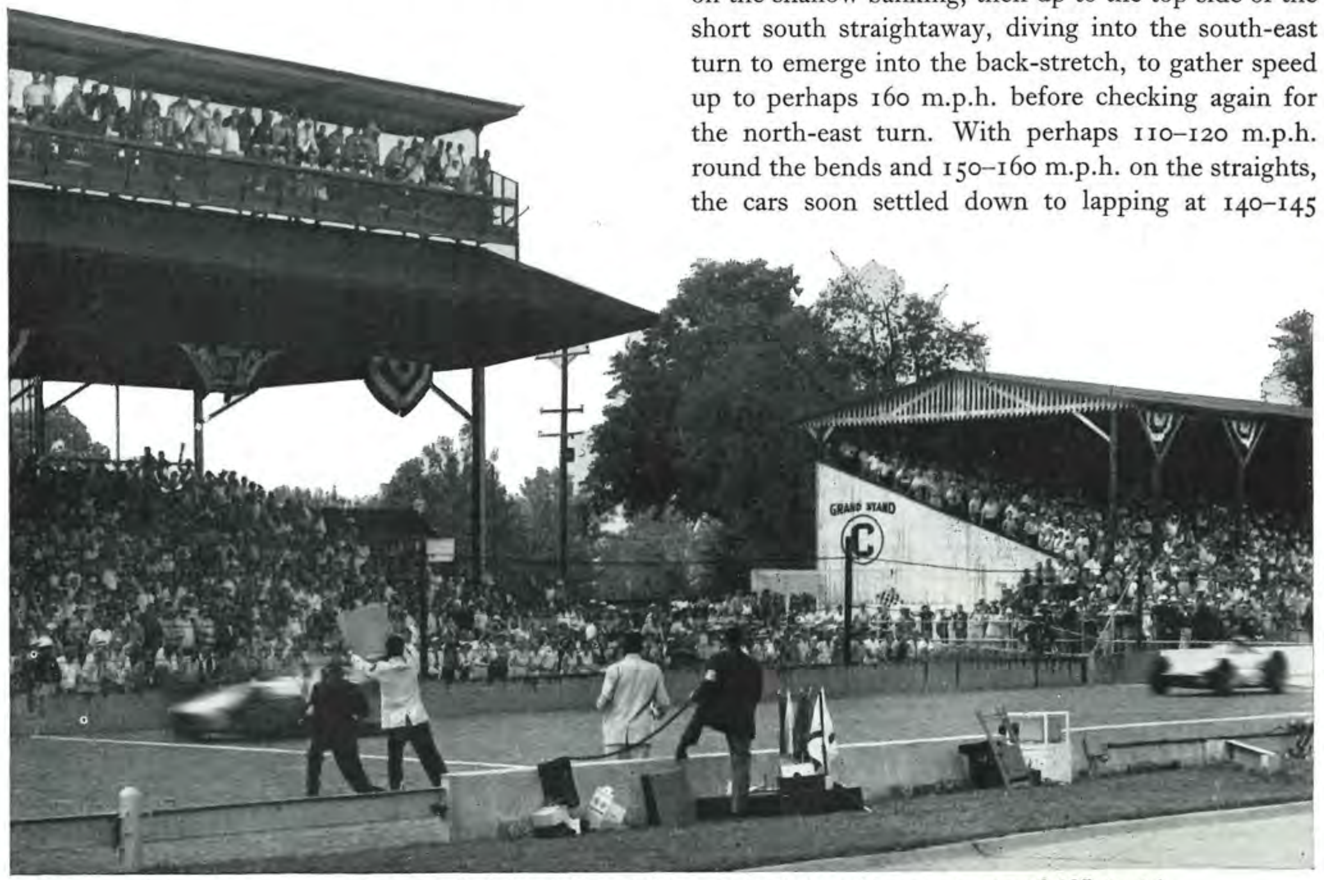
". . . an outstanding collection of apparatus designed to afford its owners a private view of the track"

unhappy exception whose mechanics began frantically to push, gently ambled off round the track in eleven rows of three, docile for the moment behind the open white Buick pace car, disappearing on the far side of the track and then as heads strained to the right and everybody stood up they all came by, roaring a little now at a good 60 m.p.h. This was not as I'd thought the rolling start but the end of the Parade Lap and then in no time at all they were gone and then in sight again, this time moving at a spanking 90 m.p.h. As they came up to us the pace car pulled to the side and the whole roaring, howling mob of brilliantly coloured cars tore hell for leather over the line and dived for the first bend.

This flying start and the first lap that follows are really something. Indeed I would guess they are like nothing on earth for they must need nerve and courage and skill of a very high order and even then the risks of a first lap disaster are enormous. In the first lap of the 1958 race, which got off to a notoriously ragged start, 15 cars were involved in the biggest pile-up in racing history and one driver was killed.

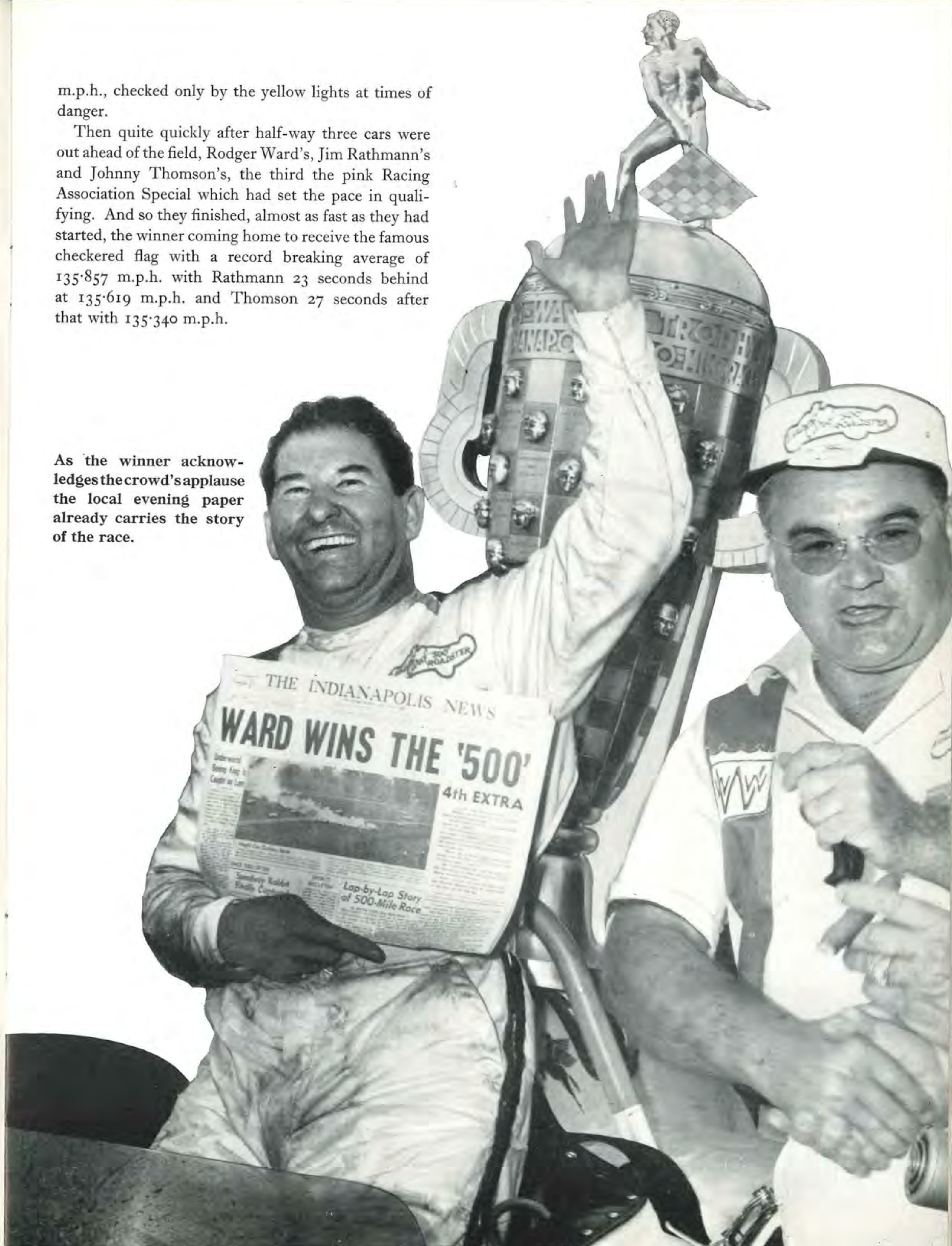
When an accident has occurred and the track is being cleared of damaged cars or oil, the yellow lights go on and the field has to slow down to about 80 m.p.h. and no overtaking is allowed. These are the times most favoured for pit-stops as although the seconds lost are the same, the distances lost are less. Three or four pit-stops are necessary for every car to change wheels, and fuel is always taken on at the same time; either all four wheels are changed or else both back and the starboard front wheel are changed while the driver takes a drink offered him on a long stick while changing his goggles. These pit-stops are accomplished with every possible mechanical device and at incredible speed; in the 1959 race one was completed in 19 seconds and many in between 20 and 25 seconds. This year's race was almost won in the pits for the winner's three stops cost 73 seconds and the second car's cost 86·4 seconds.

So now the race was settling down to the steady grind, the field spread out with cars on different laps and all the confusion of a long-distance race. Down the home stretch the cars would come, up to perhaps 150 m.p.h. with a snarling roar, then a check of speed to enter the south-west turn, surprisingly low down on the shallow banking, then up to the top side of the short south straightaway, diving into the south-east turn to emerge into the back-stretch, to gather speed up to perhaps 160 m.p.h. before checking again for the north-east turn. With perhaps 110–120 m.p.h. round the bends and 150–160 m.p.h. on the straights, the cars soon settled down to lapping at 140–145 m.p.h., checked only by the yellow lights at times of danger.



The winner crossing the finishing line with a record-breaking average of 135 m.p.h.

Then quite quickly after half-way three cars were out ahead of the field, Rodger Ward's, Jim Rathmann's and Johnny Thomson's, the third the pink Racing Association Special which had set the pace in qualifying. And so they finished, almost as fast as they had started, the winner coming home to receive the famous checkered flag with a record breaking average of 135·857 m.p.h. with Rathmann 23 seconds behind at 135·619 m.p.h. and Thomson 27 seconds after that with 135·340 m.p.h.



As the winner acknowledges the crowd's applause the local evening paper already carries the story of the race.

Ultrasonic Wonders

By H. M. Stanier (General Chemicals Division)

Think of sound waves with intensities millions of times greater than the noise from a motor bike, but with a pitch, or frequency, so high they cannot be heard and you have high-intensity ultrasonic waves. Applied to liquids and solids, such waves will break the strongest of materials, produce dispersions, emulsions and sprays, and cause a host of other effects. Just how the waves are produced, what they are like, and the effects they achieve are described here in simple terms.

THE science of ultrasonics is not new. The first developments of practical importance took place during World War I, when great efforts were made to use ultrasonic waves for detecting submarines. Steady progress was made in this sound radar in the interwar years, and in addition the potentialities of high-intensity ultrasonic waves for producing emulsions, dispersions and sprays, and for influencing chemical reactions were first demonstrated.

Advances in electronics during and since the last war have enabled the practical uses of ultrasonic techniques to be extended appreciably. Thus, not only were they used extensively during the war for the detection of submarines, but instruments employing similar techniques are now available for testing materials non-destructively and for measuring their thickness. In addition ultrasonic devices are marketed for drilling holes of any desired shape in very hard materials, for example glass, for cold-welding metals, for soldering aluminium and other metals difficult to tin, and for thoroughly cleaning special or valuable items such as lenses, ball-bearings, and jewellery. Machines which depend partly on ultrasonic vibrations are also available for making emulsions.

So intense are the ultrasonic vibrations which can now be produced that they can be made to fatigue and break the strongest of materials. All these applications are being commercially exploited.

Perhaps of still greater interest are the hosts of fascinating effects of ultrasonics which have been demonstrated but not yet developed. To find out how many of these can be put to useful service in our industry I.C.I. has set up in General Chemicals Division a laboratory equipped for producing high-intensity ultrasonic vibrations. This article describes some of these potential applications. Before we look at them, however, let us see how the vibrations are produced and what takes place when they are applied to a liquid.

If you hit the end of an iron bar with a hammer it rings. The sound you hear is caused by the whole bar vibrating at its natural frequency. An ultrasonic vibrator is a similarly vibrating bar or disc, ultrasound being emitted from the end of the bar or the face of the disc.

The mechanical force to drive the vibrator is usually derived from expansion and contraction caused by applying an alternating magnetic field to a magneto-strictive metal such as nickel. Power, in the form of an alternating voltage and current, is fed to the system from a generator rather like a radio transmitter or, for very large installations, from a motor generator.

When the vibrating face of such a vibrator is immersed in a liquid, the pulsations of the face cause the liquid to be alternately compressed and subjected to tension, and waves comprising alternate regions of compression and tension move out into the liquid rather in the way ripples on a pond move out from the point where a stone is dropped into it. Although the movement of ultrasonic

vibrators rarely exceed a few thousandths of an inch, this movement takes place in such a short time, usually somewhere between one-millionth and one twenty-thousandth of a second, that the pressures set up in the liquid appreciably exceed atmospheric pressure. Under these circumstances, there is a tendency for liquids to be pulled apart by the tension to form cavities.

When the compression part of the wave reaches these cavities, they collapse again and, under suitable conditions, the liquid rushes in at such a rate that locally very high pressures amounting to hundreds of tons per square inch can build up. The production and collapse of cavities to form these very high pressures are known as cavitation. The singing of a kettle as it comes to the boil has its origin in mild cavitation. Housewives make use of the phenomenon when they boil their clothes to help remove the dirt.

Strong ultrasonic cavitation is however much more severe and gives rise to sounds rather like the noise from a waterfall. It is this phenomenon of cavitation which is responsible for most of the interesting effects of ultrasonic radiation.

The application to cleaning has already been mentioned. Here the effect is truly startling. Immediately an object such as, for example, a cigarette case which has just been polished is placed in a vibrated solvent such as trichloroethylene, the dirt and polishing compound explode from the surface like smoke from a gun, and are removed even from the smallest of crevices, where no brush or jet would penetrate. Consequently the surface looks much brighter, and furthermore it is so much cleaner that further processing such as electroplating is greatly facilitated.

Although so far the high cost of producing ultrasonic radiation has limited its use in cleaning to comparatively expensive items such as jewellery, or to such items as ball-races where absolute cleanliness is essential to their free running, the field shows signs of expanding. In Germany the method is being used commercially in strip-metal rolling mills, and an experimental plant for the same purpose built by the Company has shown some promise.

Cavitation is also the mechanism behind ultrasonic emulsification. For this particular application ultrasonic vibrations are usually produced mechanically rather than electrically, being derived from a blade similar to a safety-razor blade, set in motion by a jet of liquid impinging on it.

The advantage of ultrasonic emulsions over those produced in conventional homogenisers (or "cream makers") lies in the smallness of the droplets produced, which give better texture and stability to the emulsion.

The method is used in the cosmetics industry where its cost can be absorbed. In many other cases the obtaining of better emulsions is probably not warranted, and indeed they would not be stable unless specially stabilised.

In the field of chemistry, however, it appears that the extra degree of dispersion which can be obtained may be really valuable for surface reactions. In these the speed of reaction depends on the area of surface of one reactant which is exposed to another in which it is suspended. Ultrasonically produced emulsions show promise of accelerating such reactions which would otherwise be impossibly slow, and also of initiating others which could not start at all.

The attainment of small particle sizes is not limited to emulsions. Solid particles in suspension may also be broken down. They can be made so fine that they take days to settle out, and in some cases colloidal solutions are formed which never break. It is interesting that, when the particles become very small, the colours of the suspensions change. A typical sequence is grey, almost white, blue, and finally purple with very fine particles. Practical applications may one day be seen in the field of pigments, dyestuffs and catalysts, to quote only three examples.

The effects I have touched on in this article are all well established. The ways in which they can be applied are very diverse and to attempt to describe them all would take too long. But the following headings give some idea of the wide field of further application: accelerated corrosion testing, fatigue setting of metals, improving adhesion of paints and resins, penetration of chemical reagents and dyes into textiles and anodic films, extraction processes, coagulation of polymer dispersions, removal of reaction products and replenishing of liquors at surfaces, especially in electrolytic processes such as plating, and the breakdown of large molecules.

Finally, direct activation of chemical reactions can be caused by ultrasonic cavitation. This is probably due to the production of very high temperatures when ultrasonically formed cavities collapse. Academic research has been aimed at explaining the mechanism of such effects, which appear to be without practical importance.

SIR EWART SMITH

With the retirement of Sir Ewart Smith, formerly a deputy chairman of I.C.I. but perhaps better known as I.C.I.'s Technical Director, the Company lost a leader of unusual force and personality. This appreciation of Sir Ewart appeared in a recent issue of the *New Scientist* under the title "The Art of Good Management."

BEHIND the doors at Millbank in London, and the factory gates at all sorts of different places, there lies a world that in some ways seems quite self-contained, like a great monastic order in the Middle Ages—the world of Imperial Chemical Industries. There are no vows to prevent men coming out, and I.C.I. men have gone on to a multitude of significant positions elsewhere; but somehow the quintessence of I.C.I. appears to lie in the way that men are taken into the Company when they are young and stay with it until they retire. Not surprisingly, there are some who become giants within the system, influencing large numbers of their fellows and acquiring a special standing of their own which will penetrate into the world on the other side of the gates.

Such a man is Sir Ewart Smith, and now that he has retired from the Company of which he was a deputy chairman there must inevitably be a sense of void. For Smith has been a notable character within this world, and above all a notable human being. There can be few people who would not envy his gift of inspiring affection.

Not that lovableness is his only quality—he would hardly have got where he has done solely on the strength of that. It was as an executive engineer that he made his way to the Board of I.C.I., and after he arrived there it was perhaps for his contributions to management, including problems of organisation, safety, human relations in general and the improvement of efficiency through work study that he rose to become a deputy chairman of the Company until he retired in March.

But his work was not confined to I.C.I. In the years since the war he has been one of the driving forces behind the British Productivity Council and one of its early chairmen; he has been a vice-president of the Institution of Mechanical Engineers, and has served on the Advisory Council on Scientific Policy under Tizard, the Committee on Scientific Manpower, the Northern Ireland Development Council and other similar bodies.

Now, in his retirement, he has taken on a further and most challenging task: he is to be chairman of a council which has been set up to assist the application of modern industrial techniques in the National Health Service. Though he is not, perhaps, an outstanding committee-man—he has not the dryness or conciseness that tends to go with that—there is little doubt that his drive, his exceptional ability to combine a zest for efficiency with a belief in people and his way of inspiring confidence in those with whom he deals, may achieve useful results in the sphere of hospital administration. Certainly he is unlikely to run into trouble with trade unions, for he established feelings of mutual trust and understanding with many of the national union leaders during their joint participation in the work of the British Productivity Council.

Smith is a man who feels that he owes much to his background and to sheer good fortune. In this he includes his parents, his schoolmasters, and his leaders in I.C.I. He comes from a middle-class, liberal and nonconformist background of the type common at the start of the century; in this self-improvement was a virtue, and Ruskin, Herbert Spencer and Carlyle were some of the literary heroes. There was a time, in fact, when he thought he would like to go into politics.

Frank Ewart Smith was born in 1897. At the age of 9 he went to the Uckfield Grammar School and at 12½ to Christ's Hospital with a scholarship; he became a Science Grecian and remained there until he was 19. The school had recently been equipped with a first-class science block, and the quality of the instruction matched it. Smith says that he can still remember with the utmost vividness many of the experiments; the boys were not "instructed" by the masters—they had to find out for themselves. He is now a Governor of Christ's Hospital, and thinks education (he prefers "e-duction"—a process of drawing out, not of cramming in) the most important thing in life.

Smith won a scholarship in science to Cambridge, but before he took it up he served in Flanders for two years in the Royal Artillery. He went up to Sidney Sussex in 1919 and read mechanical sciences. One long vacation he went to work in a shipyard, long since defunct. The unprogressive attitude of management was such that he was cured of his desire to be a marine engineer. But he was able to appreciate the good sense and kindliness of the working man in the north of England, and ever since then he has shared Sir John Moore's belief that there are no bad soldiers, only bad officers.

He took his tripos with first-class honours in 1921, and then spent four terms in research on the high-temperature dilatation of iron and ferrous alloys. He was awarded the John Wimbolt Prize for a paper on this subject; but, as he points out cheerfully, he was the only entrant!

On coming down, Smith spent a few months tutoring, and then in 1923 he took a post as a research engineer at what was to become the Billingham Division of I.C.I. He started off by working on the development of high-pressure glands, but very quickly found himself in rapid succession in different jobs, covering research, the process side and engineering. He worked on automatic weighing machines, evaporation, and automatic controls of process plant. For a while he was a shift manager, then assistant chief engineer on boilers and gas-making plant, later deputy chief engineer and then deputy works manager; after this he was chief engineer on the hydrogenation process. This rapid alternation of function and of technical work instilled in him a tenet which has ever since been the basis of his views on training young men. He has always sought to give them the variety and early responsibility that he himself had.

In 1932, at the age of 35, he became chief engineer at Billingham. Since 1927 he had been deeply involved in the engineering aspect of the enormous expansion of Billingham, and this work went on. Then from 1937 onwards he was concerned in the building of the shadow factories for the manufacture of ammonia, ammonium nitrate, aviation petrol and other important war materials. Most of these plants depended on hydrogen compression to 350 atmospheres; he took the courageous step of using for this purpose a novel type of 350 atmosphere compressor of 1900 h.p. designed at Billingham. It went from drawing-board to production with no possibility of prototype trials. Today some forty of these machines operate with an availability of about 98%; he does not like to think what would have happened if they had failed.

With the coming of the war, Billingham was working at full pressure. In 1941 Lord Beaverbrook decided to hurry the production of a weapon known as the Blacker Bombard by putting I.C.I. on to its manufacture. Smith took charge. In five weeks four hand-made models had been manufactured, incorporating 200 alterations of drawing. In nine weeks a thousand Bombards had been manufactured. Then Smith was given a new weapon—the PIAT and its ammunition—to develop from the ideas evolved by two gifted soldiers, Colonel (now Sir Millis) Jefferis and Colonel Blacker. In a few weeks eight or ten prototypes were involved, and he startled his team by insisting on stamping on the PIAT and dropping it to see that it would stand up to the sort of treatment which he knew from his own Army service it would get. Within six months it was in service in North Africa.

In 1942 Smith went to the Ministry of Supply as Chief Engineer and Superintendent of Armament Design, and he spent the rest of the war at Fort Halstead. To his delight he discovered that the methods of the chemical industry were equally suited to the administration of this work, and he began to visualise that certain general principles applied equally to managerial and technical problems. He was knighted for his services, and in August 1945 he was given the chance to put these principles into effect on a wider scale in his old company when he was appointed Technical Director of I.C.I.

As Technical Director, and then from 1955 onwards as a deputy chairman, Smith worked on a wide variety of tasks. He was responsible for the novel constitution of the big Wilton works. He was in charge of productivity and introduced the concept of work study in 1947—a concept which has taken such a firm hold in I.C.I. that today 1500 people are employed on it, in the design offices as well as on the shop floor. Later on he was chairman of the Board committee which worked out I.C.I.'s profit-sharing scheme. As a deputy chairman of the Company he was particularly concerned in the selection of staff for senior appointments and with the organisational problems. All the time he was evolving and preaching his ideas of management, with his theme of simplicity, symmetry (balance) and continuity. His contribution to engineering at large was recognised in 1957 by his election to the Royal Society—something which apparently took him genuinely by surprise, for he will say without a hint of false modesty, "I'm not one of the really brainy chaps."

Sir Ewart Smith always loved his work, but his interests were not confined to it. He has had a happy family life, enjoys gardening, photography, and making things with his hands. He has carried his love of ships into sailing, and is now on a committee considering the engineering officer structure of the Royal Navy. Above all, perhaps, he has found pleasure in the young and in doing all he can for them: indeed, you will hear it said, in the kindest possible way, that he is still a schoolboy at heart. Certainly, with his zest, his uncomplicated approach and refusal to think in terms of scheming pettiness, he has qualities that, rightly or wrongly, are attributed to the young.

NEWS IN PICTURES

Home and Overseas

Shape of things to come. *Our picture shows a model of the new C.I.L. office block in Montreal on which building started last month. It was announced earlier this year by the Royal Trust Company and Canadian Industries Ltd., jointly, that C.I.L. had agreed to lease 12–14 floors of the new 31-storey building. It will carry the name "C.I.L. House," and will accommodate all C.I.L.'s head office staff. Construction is scheduled to be completed by May 1962*

I.C.I. in Scotland. *The I.C.I. stand at the Scottish Industries Exhibition, Kelvin Hall, Glasgow, held last month, covered an area of 1100 square feet. It represented the three I.C.I. Divisions, Nobel, Dyestuffs and Pharmaceuticals, which have manufacturing establishments in Scotland. Nobel Division, which has the greatest Scottish interest, occupied the largest space in the display area. Princess Margaret is seen here in front of the I.C.I. stand, accompanied by Sir Robert Maclean, chairman of the Exhibition Committee, after the official opening ceremony*

Triple coincidence. *Three well-known figures at Alkali Division's Lostock Works retired recently. Left to right: Mr. Clifford Molyneux (laboratory assistant), Mr. Bertram Birch (assistant cashier) and Mr. John Earle (cashier). All three men were born on the same day, 5th August 1897, with their respective service to the Company being 48 years, 42 years and 38 years. They are seen here against the background of Lostock Works House and the newly constructed silo*

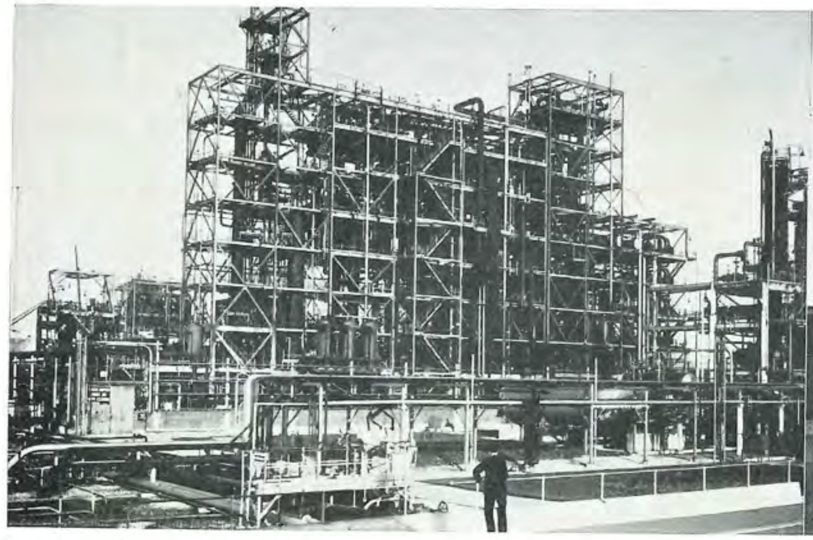
"Endeavour" prizewinners. *Sir James Gray, President of the British Association, presented the prizes for the 1959 "Endeavour" essay competition early last month in York. The prizewinners are seen here with him and Sir Alexander Fleck, I.C.I. Chairman and Immediate Past President of the British Association. Left to right: Mr. A. H. Baillie, winner of a new prize awarded this year for an essay on a scientific subject of a candidate's own choice, Miss L. H. Whibley, a Junior prizewinner, Sir James Gray, Mr. P. Broda (first prize), Sir Alexander Fleck, Mr. R. D. Preece, a Junior prizewinner, Dr. T. I. Williams, editor of "Endeavour," and Mr. R. D. Robertson, Deputy Secretary of the British Association*

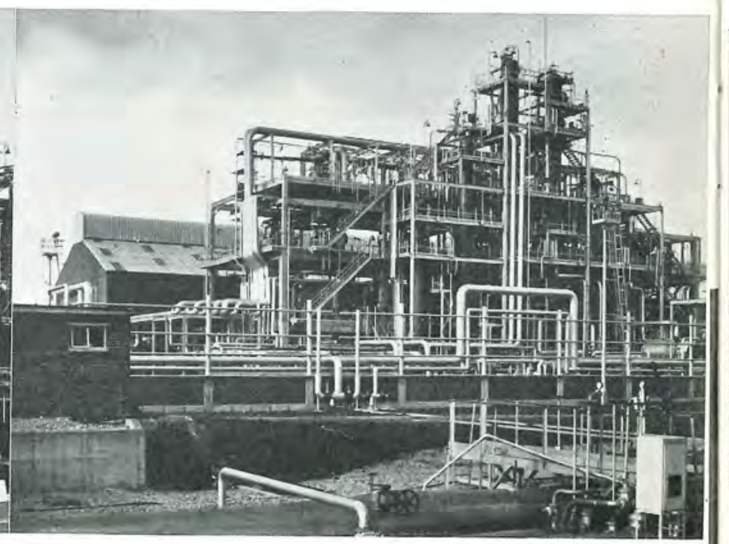
Merry wives of Wilton. *When "Henry V" was produced in the grounds of Ormesby Hall, Middlesbrough, recently, not only were many parts taken by men from Wilton Works, but of the only four speaking parts for women in the play three were taken by I.C.I. wives. Seen here are (left to right) Bob Thomas (Accounts Dept.), Mrs. Joy Elfer, Alec Blackwood (Apprentices Training School), Mrs. Margaret Heseltine, Mrs. Joan Pacey, John Marron (Apprentices Training School) and George Ward (Engineering Dept.)*

Summer storm. *During one of this summer's almost tropical storms, Mr. H. H. Oakes (Plastics Division) took this impressive lightning shot. Details of interest to photographers lie in the "striations" within the flash and also the patches of diffuse light. It is thought that the patches, which cannot be accounted for by rain drops or fingerprints, may be glowing ionised gas or a refractive effect due to "bubbles" of hot air*

Fish fight. *Fishing off the coast of Puerto Rico, Mr. Eric Widdowson (left), I.C.I. agent in the Dominican Republic, landed a 780½ lb. marlin. He believes it to be a world record and his claim is still pending with the International Game Fish Association. A 2-hour fight to land the fish ended with it lashed to the side of the boat and a 12-mile dash to shore to avoid mutilation by sharks*

Cushy job. *Mr. Eric Bailey, of A.E. & C.I.'s Salisbury Office, relaxes on one of the tents made up out of a 14,000 yard 'Vynilon" order—the biggest yet in the Federation. Pest Control, who placed the order with Mr. Bailey, will use the PVC coated nylon, manufactured at Somerset West, for large tents in fumigation experiments. The order was obtained in face of fierce competition from American and Australian suppliers*



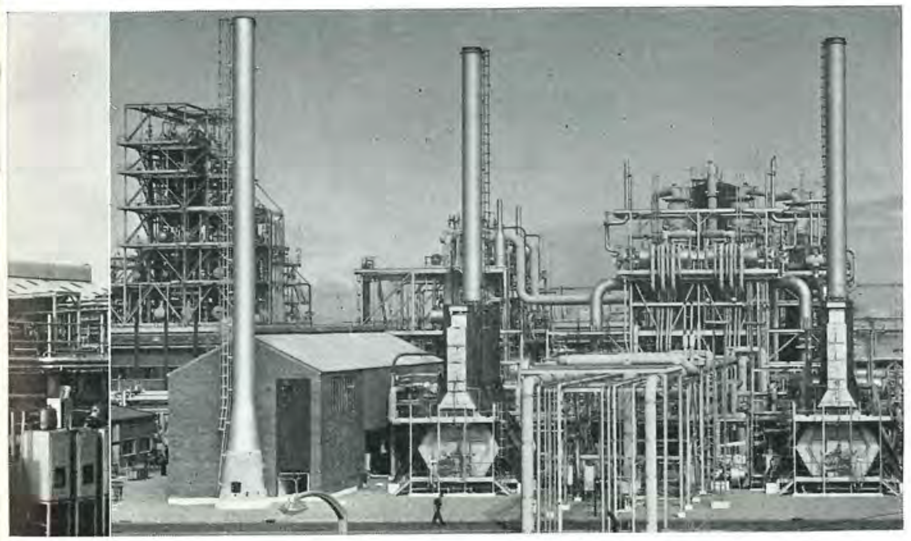


Building and walking *over an improvised bridge was just one of the techniques mastered by 29 boys from Billingham Division at a course run by the Education Department, to test character, initiative and physical fitness. It was held at the Durham County Youth Training Centre*

Landore's biggest. *Our picture shows one of the largest metal plates ever made at the Landore Factory of Yorkshire Imperial Metals Ltd., an associate company of I.C.I. The man standing near gives some idea of its great size—13 ft. 3¾ in. and weighing over 3⅛ tons*

Rock 'n' roll *won Beryl Brock of Nobel Division's Westfalite Factory a gold watch when she took first prize in a rock 'n' roll contest while on holiday in Blackpool. This photograph was taken during the contest, which was sponsored by the "Daily Mirror." Margaret Brammer, also of Westfalite Factory, won third place and a camera*

"Foot safety." *Mr. M. B. Pallister, Billingham Division, was the winner of a "Foot Safety" competition sponsored by International Safety Products Ltd. He is receiving his £50 prize from Managing Director Mr. G. Denton. Messrs. W. Meale (Billingham) and F. Moore (Lime Division) also won prizes*



Wilton's third and largest oil cracker *came into full production last month, making I.C.I.'s complex of plants there and at Billingham the biggest petrochemicals venture outside the U.S.A. and the largest anywhere based on liquid feedstocks. Left: No. 1 Olefine plant which started up in 1951. Centre: No. 2 plant which came on stream in 1956. Right: The new No. 3 Olefine plant. All are operated by Heavy Organic Chemicals Division*

Family affair. *Another record crop at Fernhurst, and Plant Protection wives help with the rush of picking. In the foreground is Mrs. Clive Proctor, whose husband is a member of Publicity Department, Fernhurst*

New Scottish record. (*Left to right*) *Delena Telfer, Sandra Marshall, Marion Brown and Isabel Bond (Nobel Division) had good reason for looking happy. They had just established a new Scottish record of 50·0 secs. for the 440 yards Sprint Relay and won the championship for the second year in succession at the Cowal Games. The following week-end, with Ann Reilly replacing Marion Brown, they claimed a further new record for the Scottish Women's Mile Medley Relay race with 4 mins. 17·9 secs., an improvement of 9·3 secs. on their own previous record*

The Sunbeam Alpine, *the new Rootes Group sports car, is upholstered with I.C.I. (Hyde) Ltd.'s 'Vynide' and panelled with 'Vyweld,' a luxury-touch padded material. Orders to the extent of 15½ million dollars have already been placed by U.S.A. dealers*

Wilton's first foreman. *Mr. Jack Watling, who first joined the Company in 1927 at Billingham Division and became Wilton Works' first foreman in 1946, retired last month. He is seen here (left) with Mr. R. E. Newell (Managing Director, Wilton Works) receiving a silver tea service with congratulations and good wishes on his retirement*

Synthonia Juniors v. Lyngby Boldklub. *Billingham Division's Synthonia Junior soccer team had their second "international" match this year when they met the Lyngby Boldklub of Copenhagen recently. The two captains are seen leading their teams on to the field at Billingham stadium. The Danish team won 3–0*

Little Miss 'Dulux.' *Pretty Rona Smith took second prize in Haltwhistle's annual carnival. Her eyecatching fancy dress consisted entirely of standard retail display items of Paints Division products*

Ideal Home Exhibition. *I.C.I. (Export) Ltd.'s stall at the recent Colombo Exhibition was mainly built of 'Perspex." An interesting feature was the use of flat window sheets tinted in various shades which looked particularly attractive at night*

Merchants' Cup. *Competing against 55 teams from Calcutta's leading mercantile firms in the Merchants' Cup golf tournament, I.C.I. (India) won the competition, beating Burmah Shell by 2 strokes. Members of the team were (left to right) Messrs. A. Puri, G. T. Cubitt, D. B. Mohindra, H. M. Molesworth, G. W. Shaw and N. S. Watson*

Rag trade bulletin. *The dress with the wide picture style neckline and unpressed box pleated skirt is in a chocolate brown and black marguerite design of 'Terylene'/wool worsted fabric. Made by Horrockses, it retails at about 11½ gns. Warm for winter evenings and week-ends, our picture (bottom right) shows slacks in royal blue 'Terylene'/wool worsted with a printed black design. They are by Goodman Bros. and Stockman, and retail at 51s. To team up with them is a black 'Terylene'/cotton blouse by H. Price at approx. 49s. 6d. All the printed 'Terylene'/worsted fabrics used in these models are by Sydney Hytner Ltd. The hat (below) is one of the first to be made in leather-look 'Vynide.' By Jacoll, it is rain-proof, spongeable, and comes in a variety of colours. It costs 24s. 11d.*

ALAN CARTER

By Denzil Batchelor

WAY back in 1919 every eight-year-old in Runcorn could swim—every one, except Alan Carter. One August afternoon, his elder brother took him down to the baths with a view to wiping out this disgrace. There, another boy, believing that lessons are best learned the hard way, pushed Alan in at the deep end. His brother rescued him, with not very much time to spare, and as a result of these shock tactics Alan refused to go into the deep end for two years. Then at last he learned to swim; first the side stroke, then the crawl.

Since then he may be said to have made up for lost time. He was Runcorn Club Champion for 23 years (from 1929 to 1952); was thrice Cheshire County Champion, twice over 100 and once at 200 yards; and he represented the county many times both at water polo and in team swimming contests against Lancashire.

He is now a plater-welder with I.C.I., but in his youth he earned 15s. a week on a buoy boat on the Mersey, getting his longest practice swims—up to an hour and a quarter—in the canals, which were a good deal cleaner a third of a century ago. At 14 he played his first water polo, and three years later had his narrowest escape from death when an 18-stone member of the Liverpool Police team sat on him on the bottom of the bath and refused to be dislodged.

He got far in the sport: but he might have got further. In 1935 he was one of the top eight sprinters in the country and a "possible" for the Berlin Olympic Games in the following summer; but the Runcorn baths shut for the winter, he lost his form, and with it his chance of swimming for England. Alan, a balding, bear-shaped chap, only loses the grin from his ruddy face when he thinks of this seasonal closing of those baths. They shut at the beginning of November and reopen in April; and if they didn't shut there would be—in his view—a great many more first-class swimmers in Cheshire than there are today.

How is it that the Australians are able to win eight out of eleven events in the Olympic Games? Well, to begin with, they probably get five times as many swimming hours as our hard-working young men can squeeze in. But it isn't only due to the fact that they have more sunshine for swimming in the Pacific than we enjoy over here. The main point is that they transport their top squad to a specially built village in the outback for four months' training a year in a perfectly equipped pool. Everything is laid on—even education for the school-age champions. "Compare that with what happens over here, where the bath is shut for five months of the year," says Alan. "Give us the same facilities, and we'll produce as many champions."

His perpetual plea is for more baths; and here he feels that industry, which has helped so much already, can help even more. He would like a loan of enough money to build a bath in Weston Point, a suburb of Runcorn; and believes that from the takings the original loan could be repaid in five years. Meanwhile he is warmly grateful for all that is done now to encourage his sport. There is, for example, I.C.I.'s Inter-Division competitions, with the championship at present held by Billingham, who have on their strength Ron Stedman, English international and sometime freestyle sprint champion.

Though he still enjoys a game of water polo, Alan retired from serious swimming races in 1951 and today acts as judge and timekeeper, as well as serving on the executive of the county and Northern Counties associations. He is impressed by the amazing advances made in recent years, largely due to improved coaching. Before the 1955 Empire Games, for example, our swimming squad was given a course of special training at Loughborough by Matt Mann, an Englishman long settled in the States, who made his name by his work at Michigan University. The training was tougher than anything our boys had seen before. Mann made them go at top pace in practice swims—an innovation in itself—and put the 100 yards competitors to swim the course seven or eight times running, instead of once as had been the custom. If we could lay on four or five months of this concentrated training annually, Alan believes that we should have nothing to fear in world competition.

As it is, we can hold our own with any country in Europe in swimming, though we rank below Hungary, Russia, Western Germany and Holland in water polo. This game has been revolutionised in recent years. When Alan first played it, it was generally considered a sport for older men who had lost most of their speed as sprinters. Now the best players are young—and fast: if not the fastest men in swimming, very near to the top. Every member of the champion Hungarian team, for example, can swim the hundred in 56 seconds. But, of course, records have improved out of recognition. Alan himself in 1936 was capable of swimming 100 yards in 58 seconds, at which time the quickest Americans were some six seconds faster. Now the best men in the world can do the trip in 49 seconds.

And water polo too is changing as a game. It can be the roughest game in the world—there probably never was a fiercer free-for-all in any sport than the last Olympic match between the Hungarians and the Russians. Today the game is being tightened up, and the old fouls—punching, stabbing in the wind, holding your man, "twisting the legs and kicking where you shouldn't"—are being eliminated, to the satisfaction of spectators, though it must be admitted that many players enjoyed the seven-a-side battle royal.

A great life, Alan's, and a happy one to review now that he puts so much back into the sport from which he derived such pleasure. In spite of the fact that it cost him, during his career, hundreds of pounds in time off, he still champions its amateurism. He remembers as his best performances his second place in the Mersey Mile in 1936 when the swing of the tide cost him the race; and a race against Lancashire in 1935, in which he again finished second, beating a strong favourite from Warrington, in spite of the fact that a lacerated jaw in a car smash had kept him out of the water for a month before the event.

And his funniest experience? "There can be no doubt about *that*. It was in the I.C.I. Inter-Divisional races at Stretford in 1953. Muscular contraction when I dived in caused me to lose my trunks. And my modesty caused me to lose the race."

People and events . . .

A Third Cracker for Wilton

Last month, coinciding neatly with Wilton's tenth birthday, the third—and largest—oil cracker to be built on the site came into full production. This makes the Company's complex of plants on Tees-side the largest petroleum chemicals venture anywhere outside the United States, and the largest in the world based on liquid feedstocks as opposed to natural gas. The amount of money involved is enormous. Over half the £100 million spent at Wilton during the past ten years has gone into activity associated with petroleum chemicals.

This olefine plant raises Heavy Organic Chemicals Division's olefine capacity by 60 per cent. Output of the chief product, high purity ethylene, is now about 110,000 tons a year. About 90 per cent. of this is piped to the neighbouring polythene plants (there are four of them) operated by Plastics Division.

The next most important product from the olefine plants is propylene, quantities of which are to be pumped before long to the new polypropylene plant announced in our June issue. Among other Wilton plants dependent on the oil cracking process for their raw materials are the 'Terylene' plant (Fibres Division), the 'Lissapol' detergent plant (Dyestuffs) and the 'Butakon' synthetic rubber plant (Plastics).

The new olefine plant, which was designed and constructed for I.C.I. by the Kellogg Co. of New York, requires only 12 process staff to man it per shift. But they have no less than 13,000 h.p. helping them. The plant has something like 50 miles of assorted piping, including 11 miles of air signal piping for automatic control. Construction involved the use of 5400 tons of pipes, valves and fittings, and no less than 25,000 X-ray photographs were taken to make sure that the pipe welds were satisfactory. The No. 3 plant uses essentially the same processes as the first two plants but is much larger. The plant operates at temperatures ranging from 2000 degrees Fahrenheit in the pyrolysis section, which converts or cracks the petroleum feedstock (naphtha) into a mixture of gases and crude motor spirit, down to 200 degrees below zero at one stage in the product separation and purification section.

One special feature of No. 3 plant, novel as far as we know to any large manufacturing establishment in the world, is the battery of free piston gas generators which drive the turbines for the gas compressors. While these generators are economical in running, the scale of the operation is so vast that they together consume enough fuel every day to drive a double-decker bus ten times round the world.

* * *

I.C.I. in the Argentine

The Company is contributing £1½ million to a major modernisation and development programme which is planned by Duperial Argentina, a subsidiary of I.C.I. These plans were announced by **Dr. Ronald Holroyd,** one of I.C.I.'s deputy chairmen, during a special interview with President Frondizi in Buenos Aires.

The project is expected to cost in the region of £2¼ million and the rest of the money is coming from local sources in the Argentine. A new 80-acre site in a growing industrial area on the banks of the Paraná River 200 miles north of Buenos Aires is to be developed. Here plants are to be constructed to make sulphuric acid, carbon bisulphide and hydrogen peroxide to replace existing plants of lower capacity, and, in addition, an entirely new plant for the manufacture of phthalic anhydride—a chemical widely used in the manufacture of paints, synthetic resins, dyestuffs and pharmaceuticals. When the new plants come on stream, sulphuric acid production will be stepped up by two-thirds to 50,000 tons a year, carbon bisulphide and hydrogen peroxide capacity will be more than doubled.

The site at present comes in the "green fields" category and Duperial's building programme includes, besides the actual plants, a private power station, roads, offices and laboratories.

In view of this increased interest in local production, Duperial have decided to appoint a Chief Engineer who will have a seat on the Board. He is **Mr. L. W. Norfolk,** who for the past 18 months has been working on the Severn-side project as Engineering Manager.

Ten Years Ago

"What we have seen this morning cannot adequately convey what Wilton will be like when our manufacturing operations are in full swing. The orchestra is only tuning up. I hope you will come back later on, when the £22,000,000 that we have planned to spend on the first stage of the Wilton project has been fully expended; then, gentlemen, you will see a sight to remember—a centre of modern chemical industry to which the world's scientists may well make pilgrimage; a triumph of design and co-ordination to which industrial architects will long refer for inspiration; a showpiece of Industrial Britain proving, thank God, that there are still some fields in which we blaze the trail and in which we have no intention of growing faint and weary and losing our grip."

Lord McGowan
Wilton Works Opening
14th September, 1949

Wilton's Water Baby

A small fellow with a big ambition. That is 15-year-old **Brian Pears,** a 'Terylene' bobbin boy at Wilton Works. His aim is to represent Great Britain in Olympic springboard and firmboard diving. Already he is making quite a name for himself in swimming circles.

The first important contest he entered was at Durham as recently as June this year, when he gained a fourth place in the men's three-metre springboard diving championships. Then in July he was picked to represent the North of England against Scotland. Although his team was defeated it was a personal triumph for Brian, who was the youngest competitor. His five dives—four from ten metres and one from five—earned him a second prize in the men's class.

Brian Pears

His toughest test came last month when he entered for the National diving championships held at Blackpool. He was placed tenth in the boys' three metres competition which was won by Britain's No. 1 diver and European highboard champion, Brian Phelps.

Incidentally, does Brian Pears swim? "Yes, I can swim. But not very far," he admits.

The Belle of Farnborough

The first plane to be finished in British European Airways' new house colours of red, white, grey and black—the Vickers Vanguard—showed its paces at the S.B.A.C. show at Farnborough last month. The plane seen then is actually the third Vanguard to be built by Vickers, and B.E.A. have twenty on order. The Vanguard traces its lineage back through the world famous civil airline Viscount, the military Valiant and the Wellington of World War II days, taking in on the way a host of design experience from the projected V1000 which was shelved before it flew.

A completely new departure for civil aircraft, Paints Division finishes are used on every inch of the fuselage and wings with the exception only of the wing leading edges, which are polished aluminium. The wings are poppy-coloured, the fuselage white and grey with a black band running from nose to tail. But this is not just pretty paint. It has a job to do. It protects the aircraft from atmospheric corrosion, helps to keep the interior cool, cuts out

PEOPLE

With 50 years' service to his credit **Mr. Tom Wood,** a member of a family with over 500 years of work for I.C.I. between them, retired from Metals Division's Elliott Works at Selly Oak on 28th August. He was 12 when he started there as an office boy at the princely wage of 5s. a week. His final job was as foreman of the Guide Mill.

Another employee of Kennal Vale Factory (Nobel Division) has been honoured by the Order of St. John. He is **Mr. A. J. Hopper** whose appointment as a Serving Brother has been approved by the Queen, Sovereign Head of the Order. Mr. Hopper has been secretary of his local Ambulance Division for the last 13 years. The other Serving Brother at the factory is Mr. W. Inch.

Mr. P. P. Mehta, the third Indian to be awarded a technical scholarship for study at a British University by I.C.I. (India), starts a three-year course at Liverpool later this month. He holds B.Sc. and M.Sc. degree of the University of Surat, where he has been a lecturer since January 1958.

Dr. F. L. Rose, an associate research manager of Pharmaceuticals Division and one of I.C.I.'s three Fellows of the Royal Society, has been appointed honorary reader in organic chemistry in the University of Manchester. This is in addition to his I.C.I. duties and is the first such link with a University.

Visitors to Farnborough Air Show queuing up to go on board the Vanguard (*Photo:* The Times)

The première of Nobel Division's new film "West Coast Cargo" was at Division Council on 29th September. The colour film made by the I.C.I. film unit replaces "Nobel Began It," which is now out of date. Our picture shows Mr. David Evans (background left), who directed and prepared the script, with Mr. Peter Grimwood, cameraman, filming Miss Isabel McConnachie, Ardeer Safety Fuse Department.

tedious and expensive hand-polishing and resists the chemical action of the new lubricating oils which are necessary for highspeed flight but can play havoc with ordinary paint and metal.

New Transatlantic Cable

A NEW transatlantic telephone cable system estimated to cost about £8 million is to be laid between Oban in Scotland and Grosses Roches on the Gulf of St. Lawrence during the summer of 1961. Manufacture of the cable, which will incorporate over £½ million worth of polythene to be supplied on a fifty-fifty basis by Plastics Division and our Canadian subsidiary, C.I.L., began last month at the works of Submarine Cables Ltd. at Greenwich.

The new cable will be the first ocean link in a projected Commonwealth round-the-world telephone system. It will provide for 60 simultaneous telephone conversations or some 48 telegrams in place of any one of them—the first transatlantic cable inaugurated in 1956 provides for 36 simultaneous calls, but only 6 channels are available to Canada.

A completely new type of cable developed by British Post Office engineers is being used for the deep-sea sections. The old-style cable used for the first transatlantic link has a layer of steel armouring wires wound round the outside to give it strength, and to provide

some protection. In deep water, where almost perfect stillness prevails, the sole value of the external wires is to take the strain during laying and recovery operations.

A serious trouble with such cables is that they twist fairly easily under tension, and this can lead to the cable being badly damaged. One way to overcome this twisting difficulty is to use a double layer of armouring wires with the layers wound in opposite directions. But this increases the cost of the cable and the cost of laying it, for heavier cable-laying engines are required, and much less cable can be carried in the tanks of the cable-laying ship.

Instead the Post Office engineers have designed a revolutionary new cable with a core of steel wire, stranded for proper balance, which eliminates the tendency to twist. Over this go in sequence the inner copper conductor, the insulating material (polythene), the outer or return aluminium conductor, a polythene film tape, an aluminium screening tape, a textile tape impregnated with anti-corrosion compound and finally a polythene protective skin. The weight of the new cable is only two-thirds of that of the older cable; the cost is the same.

Wilton's First Ten Years

ELSEWHERE in this section we quote from Lord McGowan's speech at the official opening of Wilton Works on 14th September, 1949. In the ten years since then over £100 m. has been invested on the site and another £20 m. sanctioned. Here are some of the landmarks.

September 1949: Plastics Division's 'Perspex' Plant.

August 1951: Heavy Organic Chemicals Division's (then Billingham Division) No. 1 Olefine Plant.

November 1951: Plastic Division's (then Alkali Division) No. 1 Polythene Plant.

September 1952: Plastic Division's US/WF Moulding Powder Plant.

January 1954: General Chemicals Division's Chlorine Plant.

January 1955: Fibres Division's No. 1 'Terylene' Plant.

September 1956: Fibres Division's No. 2 'Terylene' Plant.

October 1956: H.O.C.'s (then Billingham Division) No. 2 Olefine Plant.

November 1957: Dyestuffs Division's Nylon Plant.

September 1959: H.O.C.'s No. 3 Olefine Plant in full production and part of No. 4 Polythene Plant.

Although there are now 25 plants in production at Wilton and construction is well under way on the new 'Propathene' Plant and on No. 3 'Terylene' Plant.

'Visqueen' Saves Lives

SEVERAL healthy youngsters are running around today as fit as fiddles because they have 'Visqueen' on the brain.

That is literally true, and if it were not for the wonder of modern surgery that placed the 'Visqueen' there, they would probably be dead.

As infants, these children suffered from a skull deformity known as "cranio stenosis," which means that the various bones which make up the skull had fused together, leaving insufficient room for the brain to increase in size. In normal babies the bones of the skull have spaces between them, to allow for normal growth.

Now surgeons in Australia after operating to separate the fused bones, are using polythene film placed between the separated bones to prevent them from knitting together again.

After the operation, the babies grow, with the 'Visqueen' packing fixed permanently between the divisions of the skull, preventing any further fusion and possible crushing of the brain.

The proof of the pudding. Each year about a quarter of a million chrysanthemum blooms worth nearly £5000 are sent to Covent Garden—where they are acknowledged among the best in the market—from Fernhurst. Part of the purpose is to prove to other growers the worth of Plant Protection's products—the chrysanthemum plants get a fortnightly dose of 'Solufeed' liquid fertilizer and are sprayed with 'Gammalin,' the commercial equivalent of 'Sybol,' to keep away greenfly and caterpillars.

Water Crisis

AS we go to press, industry on Teesside still faces the prospect of having its vital water supplies cut off. Only a substantial fall of rain or big economies can stave off the threatened deadline of 5th October which has been forced upon the Tees Valley and Cleveland Water Board and the big industrial consumers by the present drought conditions.

Billingham alone normally consumes over 6 million gallons of pure Tees Valley water a day. Since the crisis was first apparent both Billingham and Wilton Works have cut back their consumption of water very considerably but at a lot of expense.

Safety Talks

SAFETY Department's **Mr. Michael Diggle** recently spent two months in Turkey lecturing for the International Labour Office on industrial hygiene and safety problems at the Institute of Labour for the Near and Middle East.

His lectures were part of a course attended by labour inspectors, and other young civil servants not only from Turkey itself but from as far afield as Libya, Italian Somaliland, Iran and the Sudan. Visits to all sorts of industrial undertakings in Turkey formed a big part of the programme

IN BRIEF

Impalco Board Named. The Board of I.C.I.'s new subsidiary, Imperial Aluminium, has now been constituted as follows: From Imperial Chemical Industries Ltd.: Dr. James Taylor (Chairman), Mr. Berkeley Villiers (Managing Director) and Mr. Michael Clapham. From the Aluminum Company of America: Mr. DuBose Avery and Mr. F. J. Resch.

Longer Zippers. 'Nyzips,' the nylon fasteners made by Lightning Fasteners Ltd., are now available in six new lengths—from 14 to 24 inches. Up to now the longest length available has been 12 inches. The 'Nyzip' is made in 28 colours including black and white and the new autumn shade, Tortoise-shell.

No Puzzle for this Postman. I.C.I. titanium's fame has obviously spread to non-technical circles. An envelope addressed to "The Titanium Plants, Witton" found its way to the correct address the day after it was despatched, a knowledgeable Post Office official having added in pencil "Try I.C.I."

Randle First-aiders' Successes. In the British Fire Services Association National Tournament, Randle Works (General Chemicals Division) first-aiders competing against 49 other teams won the senior One-Man Ambulance and Four-Man Ambulance competitions and were runners-up in the Two-Man Ambulance competition. The members of the team were W. R. Gartland (captain), J. Bowman, G. Turner and H. Hayes.

'Terylene' at the Design Centre. Last month an exhibition entitled *'Terylene'—a British Achievement* was staged at the Design Centre, Haymarket, London, by the Council of Industrial Design. Exhibits ranged from a model evening gown designed by John Cavanagh to conveyor belting and rope.

Balloonery. A balloon, one of 600 dispatched from the grounds of the Wilton Recreation Club on Gala Day, survived a North Sea crossing and was picked up next day at Fladen in Sweden.

Billingham Division's 185 road-transport drivers have driven 10 million miles without an accident. The last driving accident which involved loss of working time occurred three and a half years ago in April 1956.

More Air Service Trials. Plastics Division air service between its Welwyn headquarters and factories at Wilton and Fleetwood, introduced as an experiment last February, is being given a further trial. The trial, which lasts nine weeks, began on 2nd September. There are two round trips a day, on Mondays, Wednesdays and Fridays.

and included everything from a vodka distillery and glass bottle works on the shores of the Bosphorus to a carriage works in Istanbul where the Simplon-Orient express is overhauled.

Even Turkey, the most westernised of all the countries represented on the course, is only just beginning to scratch the surface in safety matters. Mr. Diggle quoted the example of Turkey's steelworks and associated chemical works at Karabük where he was told they have an average of 130 lost time accidents a month. Their accident frequency rate per 100,000 man-hours (roughly a man's working life) works out at just over 10: I.C.I.'s current accident rate is 0·46. For the coal mines at Zanguldak which he also visited, the picture is far worse. There they get 10,000 reported accidents a year alone, giving the appalling accident frequency rate of 20.

Ghost or No Ghost?

NOT many people in the Company can claim as a former occupant of their home anyone as distinguished as one of Napoleon's generals. Someone who thinks he may be able to do just that is **Mr. D. S. Wilson** of Scotland and Northern Ireland Region, who lives in an old cottage at Fintry about twenty miles outside Glasgow. Here is his story.

In France the official account of

Marshal Ney's death is that he was shot in 1816 by order of Louis XVIII despite the opposition of the Duke of Wellington, who tried to save his life. But there is evidence which suggests that the execution may have been faked and Ney smuggled out of the country to America, where he became a schoolmaster under the name of Peter Stuart Ney. Certainly on his deathbed this old man claimed that he was Marshal Ney of France.

A New York solicitor set out to refute the story, but instead stumbled on Peter Stuart Ney's authentic application, dated March 1820, to become an American citizen. The document states that the applicant was born at Fintry in Scotland. Searches in the Parish records at Fintry have revealed that in the eighteenth century Mr. Wilson's cottage was a croft owned by a family called McNey. Out of several sons one became a schoolmaster in Glasgow. The young McNey dabbled in politics and was too outspoken. Scotland became too hot for him and he fled to France, where he is known to have joined Napoleon's army, but there, tantalisingly, all trace ends.

Money for Ideas

A SIMPLE idea, which probably still has his workmates pondering why they didn't think it up themselves, has won Dyestuffs Division's **Mr. Harry Coggan**, the year's top award so far reported under the I.C.I. Suggestion Scheme.

Scrap 'Melinex' polyester film is sent to Huddersfield Works to be put through a special process which converts it back to terephthalic acid—one of the basic constituents of 'Terylene' and 'Melinex.' Charging the scrap film into the reaction vessel soon proved a laborious job and attempts were made to reduce the film into small pieces for easier handling. Sawing the bales of film into thin slices was first tried but proved unsatisfactory. Then Harry Coggan hit on the idea of using a sawdust machine. It worked beautifully and he was duly awarded £7 by his Works Suggestions Committee and £5 from Plastics Division.

But that was by no means the end of the story. Although his idea had only a small application at Huddersfield, it provided the answer to Fibres Division's problem of grinding immobile stocks of 'Terylene' polymer, and he was awarded a further £75.

The biggest windfall, however, was still to come. As a result of Plastics Division's decision to start up large-scale production of 'Melinex' film at

Mr. Coggan

Dumfries (announced in our last issue) Harry Coggan's idea assumes a new importance and he has been awarded another £250 by that Division. So from small beginnings, Harry's sawdust machine has now brought in no less than £337.

Snags and Ladders

ONE of the most important items in any feminine budget is "nylons," and whether you favour the traditional type, fishnet or "stretch" nylons, whether you like them with seams or without, service weight or gossamer fine, butterflies or no butterflies, I.C.I. is on your side, madam, helping you to keep your expenditure under this heading as moderate as may be.

For, although undoubtedly one of the major scientific and social advances of modern times, nylons have one slight disadvantage as compared with their predecessors of silk or rayon—they are made of a tougher, springier

fibre which, when caught by a rough finger nail or a slight roughness on a chair, can be "snagged" somewhat more readily. And, once one of those loops or snags is formed, it's just about impossible to get it back where it belongs.

Some twelve or thirteen years ago, Dyestuffs Division developed and marketed a product called 'Calatac' MMP—a very fine dispersion of an acrylic resin—specially for treating nylons so that they became snag-resistant. The microscopic blobs of resin were deposited firmly on the threads, helping the stitches to grip each other better, with those on the outside serving as tiny "fenders" to ward off snagging contacts. Very neat and clever, and what's more, the treatment gave the nylons a rather smart delustred appearance.

Even good things can often be improved on, however, and Dyestuffs Division has just put on the market 'Calatac' ASX, a product of similar type to 'Calatac' MMP and designed to give the same happy results, only more efficiently and more cheaply.

An Artist with Wood

AN expert in wood-carving, who has many examples of his art in churches and buildings in the Teesside district, has retired from Billingham, where he was a joiner, after 30 years' service. He is **Mr. James MacKinlay**.

Outside working hours Jock MacKinlay has kept up an interest in wood-carving which dated from the days of his apprenticeship to a firm of wood-carvers in Glasgow. All the carving in the chapel of the Convent of the Holy Rood at Middlesbrough was done by him. It was a mammoth task that took him nine months of hard effort, but the pew ends, the capitals of the columns, the candlesticks and the altar cross will remain as ageless memorials to him.

Mr. MacKinlay shows one of the candlesticks he carved to a sister from the Convent of the Holy Rood

More of his work can be seen in Durham Cathedral, in Stockton Parish Church, and in masonic halls and council chambers throughout the county.

He mostly works in oak, and his tools are chisels, gauges and a mallet, although often he prefers to use the heel of his hand which is now so hard he can use it with as much force as he can use a mallet.

Incidentally, Mr. MacKinlay's brother is a specialist in another branch of woodwork—yacht-building. He helped to build the yacht "Sceptre" for last year's America's Cup Race.

APPOINTMENTS

Some recent appointments in I.C.I. are: **Canadian Industries Ltd.:** Dr. S. S. Grimley, Research Manager. **Dyestuffs Division:** Dr. G. G. T. Collin, General Works Manager, North East Coast Area; Mr. W. E. Humphreys, Works Manager, Nylon Works (Billingham); Mr. S. Roberts, Overseas Technical Manager; Mr. R. W. Sutton, Blackley Works Manager. **General Chemicals Division:** Mr. I. T. Pierce, Works Manager, Hillhouse; Mr. H. R. Leech, Works Manager, Pilkington-Sullivan; Dr. A. M. Roberts, Works Manager, Gaskell-Marsh; Mr. R. B. Peacock, Manager, Technical Department. **Fibres Division:** Mr. B. R. May, Engineering Director. **Heavy Organic Chemicals Division:** Mr. T. B. Clark, Development Director (in addition to his duties as Commercial Director). **I.C.I. (Pakistan) and Khewra Soda Co.:** Mr. J. W. Simpson, Chairman. **Metals Division:** Mr. S. P. Davies, Chief Accountant. **Plastics Division:** Mr. D. W. Ginns, Engineering Director; Mr. B. L. Cornford, Safety Officer.

Correction. Mr. D. R. Hunter's appointment was wrongly described in our last issue. He is Assistant to the Northern Regional Manager.

RETIREMENTS

Some recent announcements of senior staff retirements are: **Billingham Division:** Mr. H. T. Atkinson, Division Assistant Accountant (retired 31st August). **Canadian Industries Ltd.:** Dr. I. R. McHaffie, Research Manager (retired 31st July). **Head Office:** Mr. R. Jones, Establishment Officer (retired 30th September). **Heavy Organic Chemicals Division:** Mr. A. J. Prince, Development Director (retired 31st July). **I.C.I. (China) Ltd.:** Mr. R. J. Parsons, Sales Director (retiring 12th October). **I.C.I. (Pakistan) and Khewra Soda Co.:** Mr. W. E. Wilkie-Brown, Chairman (retiring 24th November). **Plastics Division:** Mr. G. V. Thom, Division Safety Officer (retired 30th June).

50 YEARS' SERVICE

The following employees have completed 50 years with the Company: **Alkali Division:** J. Edwards, Fleetwood Works, 23rd August; J. F. Clare, Lostock Works, 15th September. **General Chemicals Division:** Mr. J. Burbridge, Castner-Kellner Works, 1st September; Mr. J. Francis, Castner-Kellner Works, 7th July. **Lime Division:** Mr. J. Coley, Tunstead Kilns, 15th September. **Metals Division:** Mr. A. E. Banner, Elliott Works, 25th July; Mr. R. Taylor, Elliott Works, 1st September.

Bert's Catch

By Harry Brownhill

DAD and young Bert sat, side by side, on the end of the pier. Each held a fishing line and they had been sat so for almost an hour. Their patience had been unrewarded, although at intervals of a quarter of an hour or so there had been brief spells of mild excitement when young Bert's imagination had called false alarms. "Dad! Dad! Line's getting heavy. I've caught summat" had been the cry.

Three times had Dad gone over and drawn up Bert's line, only to reveal the bait still intact. Now Bert had reached his limit for this state of almost inactivity. "Hold my line a bit, Dad," he said and wandered off.

Another quarter of an hour slipped by as Dad sat there, sucking contentedly on his pipe, the lines held ready in his hand, his gaze placid on the green water. Ma came down the pier, young Bert trailing a couple of yards behind, sucking an ice-cream cornet.

"Hi," she said. "What yer caught?"

"Nowt yet," said Dad. "And look here, young Bert—get hold of this line o' yours. You wanted to come fishin', didn't yer?"

Bert took the line and after a while walked along the pier, dragging the line along through the water. All at once he stopped. "Dad! It's gone 'eavy again," he shouted.

Dad looked dubious, then got up and slowly moved across. "Give us line," he said and reached out to pull it up.

It came up reluctantly, and through the clear water a shapeless brown mass could be seen attached. "Seaweed," said Dad in disgust. "You've caught some seaweed." Pulling the line clear of the water, he began to shake it to dislodge the brown mass which, however, suddenly erupted into life with a mass of writhing tentacles.

"Blimey!" said Dad, his mouth dropping open.

Young Bert, eyes popping, whispered hoarsely, "What is it, Dad?"

"Octopus," said Dad. "A ruddy octopus." He whirled round to Ma. "Eh, Lil, must 'ave a picture of this—where's camera? Quick—go and get camera out of t'car."

Ma set down the picnic basket and her knitting and dutifully pounded off along the pier, en route for the old Ford, parked about fifty yards up the promenade from the pier entrance. Red-faced with excitement, young Bert was now running wildly about, screaming at the top of his voice, "An octopus. We've caught an octopus. We've caught an octopus."

A curious small crowd began to gather round Dad, who was still holding the catch suspended from the line at arm's length, dubious as to how to handle it. Members of the gathering crowd were now proffering advice.

"Kick it, mate," said a little man at the front. "That should kill it."

"I'll wait," said Dad. "It'll die soon."

"It won't. It takes them things about twenty-four hours to die," said another voice.

Gazing down at the quiescent brown mass as it lay on the pier boards, Dad thought of the possibility of stamping on it. He stepped close to it and tentatively raised his foot. Looking down at the dark brown leather sandal (Ma had just bought them from the local Co-op.) and thinking how unsuitable they were for this job, he was suddenly amazed to see the light brown colour of the fleshy mass mottle and suffuse angrily into a darker brown, almost the colour of the sandal poised above it.

He stepped back hastily. "Gotta be careful of these things," he told the crowd.

Impatiently, he again began to shake the line to try to free the hook, but only succeeded in embedding it still more firmly. Suddenly, young Bert was beside him, his new pen-knife grasped firmly in a grubby little fist. "Will I stab it, Dad? Where shall I stab it, Dad?"

Dad transferred the line to his left hand, reached out and took the knife while he studied the octopus.

The hook was lodged on the under-part of the body, surrounded by a raised pucker of flesh. A quick slash of the knife at this raised flesh freed the hook and the suspended mass dropped to the floor.

It looked dead. Dad pushed it with his foot, trying to edge it over the end of the pier. It seemed to be drying in the sun and partially stuck to the boards.

The stout, red-faced woman from the picture post card and souvenir kiosk appeared from behind the counter, where she had been watching the proceedings. She carried a stout iron shovel. A couple of quick, powerful thrusts and the octopus was on the shovel.

Somebody in the crowd had a belated thought. "I've heard you can eat them. You cook them first."

The shovel-bearer ignored this. Her arm swung and the octopus hit the water with a splash and slowly drifted downwards. Then there was a sudden flurry and, as a fitting finale, a discharge of inky black fluid and the creature disappeared from view.

"Well! did you see that? It wasn't dead, after all," said Dad as the crowd drifted away. He gathered up the lines slowly, took out his pipe and sat down to wait for Ma, now halfway down the pier, puffing hard and waving the camera aloft as she came.

Laughter in Court

By Fred Lazenby

IN my green, impressionable youth I was hauled up before the magistrates at West London Police Court for riding a bicycle without lights in King Street, Hammersmith, W.

It was the first time a member of my family had been caught out at anything, and my father washed his hands of me for some days. However, when the hour of reckoning arrived, he gave me a pound note and advised me strongly against entering into argument with the magistrates. Thus encouraged, I tapped on my mother's door in passing, picked up another tearful ten-shilling note, and moved on to find my sister Elizabeth waiting at the front door with half-a-crown "towards it" in coins of small denomination. It looked like being a reasonably profitable day.

The court at that time was housed in an impressive building hidden away down a little-known side street. Most of the cottages opposite had been taken over by the legal profession as offices and the opaque lower windows bore a variety of strange devices in rich gold lettering—great, rolling grandiloquent names like BENTLEY BARCHESTER, COMMISSIONER FOR OATHS and intriguing mixtures such as DAUNCEY, DAUNCEY, SPRACKLE AND DAUNCEY. Fighting down the temptation to pause awhile and meditate on the vicissitudes of the solitary SPRACKLE amid so many DAUNCEYS, I turned my back on the sunlight and entered the forecourt.

This was a huge, oak-panelled chamber furnished with a number of seats like church pews upon which a dozen or so dejected citizens sat moodily contemplating a young, prematurely cynical policeman who stood guard over the great door leading to the court. I approached him boldly.

"Good morning officer," I said cheerfully. "Just inform the magistrate that I have arrived, will you?"

"Name?" he countered, clearly undecided whether I was a "money under false pretences" type or something new in the crib-cracking lark. I gave the information.

"They'll call you when they want you," he told me, pulling the door open six inches. "Through here. Hat off, and keep quiet." He delivered the last in a hoarse whisper as he struggled to squeeze me through a totally inadequate gap in the doorway.

Somehow I got in and for the next two hours wriggled about on a hard wooden bench at the back of the court while a fast-moving file of erring motorists stepped up, heard their fate, and stepped down again. I noticed that, in the case of the heavier fines, some of the less opulent sinners asked for (and received) time to pay. It was all very new and exciting, but two hours on that hard bench had left its impression.

Suddenly, my name was called and I stepped up smartly as my captor—looking very much younger without his helmet—took the oath and started to bumble his way through his little notebook. To pass the time away I felt casually in the top right-hand pocket of my waistcoat to make sure that my precious folding money was still safe. It was not there, and I was thrusting a despairing hand into my last empty pocket as the policeman finished his piece.

"Did you . . . ?" enquired the clerk of the court shortly.

"Yes, sir," I admitted freely.

"Five shillings," said the magistrate without so much as a glance in my direction.

"Thank you, sir," I said, politely. "May I have time to pay, sir?"

Everything stopped dead. For two or three tense seconds silence fell over the court like a blanket. Then somebody laughed—I *think* it was the clerk—and suddenly the whole majestic procedure collapsed in a great gust of mirth.

"Silence!" demanded the clerk, abruptly solemn again. The magistrate looked down at me over the tops of his glasses and granted my request like a man in a daze. As for me, I was too good an actor even in those days to mess up an exit like that. I thanked the Bench with dignity and left the court with professional absence of haste.

Out in the vestibule again, I found my money at once in a little-used ticket pocket and paid the impost on the spot. But I often wonder if I am the only man in the history of English jurisprudence to get away with time to pay a five-shilling fine.

Brixham Harbour

Photo by Trevor Haines (Millbank)